

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
15 November 2001 (15.11.2001)

PCT

(10) International Publication Number  
**WO 01/085932 A3**

(51) International Patent Classification<sup>7</sup>: **C12N 15/12**,  
C07K 14/47, A61K 39/00, 38/17, C12N 15/863, 15/861,  
A61K 31/7088, 48/00

Hippocrate 74, UCL 7459, B-1200 Brussels (BE). **VAN DER BRUGGEN, Pierre** [BE/BE]; Ludwig Institute, Hippocrate 74, UCL 7459, B-1200 Brussels (BE).

(21) International Application Number: PCT/CA01/00646

(74) Agent: **PERRY, Stephen**; Sim & McBurney, 330 University Avenue, 6th Floor, Toronto, Ontario M5G 1R7 (CA).

(22) International Filing Date: 7 May 2001 (07.05.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/202,970 10 May 2000 (10.05.2000) US  
60/203,578 11 May 2000 (11.05.2000) US  
60/242,388 20 October 2000 (20.10.2000) US

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(71) Applicants (*for all designated States except US*): **AVENTIS PASTEUR LIMITED** [CA/CA]; Connaught Campus, 1755 Steeles Avenue West, Toronto, Ontario M2R 3T4 (CA). **LUDWIG INSTITUTE FOR CANCER RESEARCH** [BE/BE]; Hippocrate 74, UCL 7459, B-1200 Brussels (BE).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **BERINSTEIN, Neil** [CA/CA]; 31 Burton Road, Toronto, Ontario MSP 1V1 (CA). **TARTAGLIA, Jim** [US/US]; 7 Christina Drive, Schenectady, NY 12303 (US). **TINE, John, A.** [US/US]; 215 Broad Street, Scotia, NY 12302 (US). **MOINGEON, Philippe** [FR/FR]; Le Châlier, F-69480 Pommiers (FR). **BOON-FALLEUR, Thierry** [BE/BE]; Ludwig Institute,

(88) Date of publication of the international search report:  
6 September 2002

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: IMMUNOGENIC POLYPEPTIDES ENCODED BY MAGE MINIGENES AND USES THEREOF

(57) Abstract: The invention discloses immunogenic polypeptides comprising several MAGE-specific antigen epitopes selected from different (i.e. discrete) members of the MAGE protein family, nucleic acids coding therefor, recombinant viruses and/or cells comprising said nucleic acids, and compositions thereof. Methods for eliciting or inducing MAGE-specific immune responses utilizing the aforementioned immunogenic agents are also disclosed.

WO 01/085932 A3

B6

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA 01/00646

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/12 C07K14/47 A61K39/00 A61K38/17 C12N15/863  
C12N15/861 A61K31/7088 A61K48/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C07K A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

BIOSIS, EPO-Internal, WPI Data, SEQUENCE SEARCH, PAJ, CHEM ABS Data, MEDLINE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 20445 A (DUFFOUR MARIE THERESE ;STROOBANT VINCENT (BE); SCHULTZ ERWIN (BE);) 13 April 2000 (2000-04-13) page 42 -page 43; example 3 page 67 -page 74; examples 11-13 page 21; table 1 ---	1-40
A	VAN DEN EYNDE B J ET AL: "Tumor antigens recognized by T lymphocytes." INTERNATIONAL JOURNAL OF CLINICAL & LABORATORY RESEARCH, vol. 27, no. 2, 1997, pages 81-86, XP001053689 ISSN: 0940-5437 cited in the application the whole document ---	1-40
	-/-	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*G\* document member of the same patent family

Date of the actual completion of the international search

26 April 2002

Date of mailing of the international search report

14/05/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Le Cornec, N

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/CA 01/00646

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 34009 A (WARNIER GUY ;BOON FALLEUR (BE); LURQUIN CHRISTOPHE (BE); UYTENHOV) 18 September 1997 (1997-09-18) claims; examples 2,3	1-40
A	P. CHAUX ET AL: "Identification of five MAGE-A1 epitopes recognized by cytolytic T Lymphocytes obtained by in vitro stimulation with dendritic cells transduced with MAGE-A1" JOURNAL OF IMMUNOLOGY., vol. 163, no. 5, 1 September 1999 (1999-09-01), pages 2928-2936, XP002197553 BALTIMORE US the whole document	1-40
A	WO 99 40188 A (SLAQUI MONCEF MOHAMED ;SMITHKLINE BEECHAM BIOLOG (BE); COHEN JOSEP) 12 August 1999 (1999-08-12) claims; examples	1-5,9,10
A	HU X ET AL: "ENHANCEMENT OF CYTOLYTIC T LYMPHOCYTE PRECURSOR FREQUENCY IN M MELANOMA PATIENTS FOLLOWING IMMUNIZATION WITH THE MAGE-1 PEPTIDE LOADED ANTIGEN REPRESENTING CELL-BASED VACCINE1" CANCER RESEARCH, AMERICAN ASSOCIATION FOR CANCER RESEARCH, BALTIMORE, MD, US, vol. 56, 1 June 1996 (1996-06-01), pages 2479-2483, XP000605404 ISSN: 0008-5472 the whole document	1-40
A	GAUGLER B ET AL: "HUMAN GENE MAGE-3 CODES FOR AN ANTIGEN RECOGNIZED ON A MELANOMA BY AUTOLOGOUS CYTOLYTIC T LYMPHOCYTES" JOURNAL OF EXPERIMENTAL MEDICINE, TOKYO, JP, vol. 179, no. 3, 1 March 1994 (1994-03-01), pages 921-930, XP000576724 ISSN: 0022-1007 cited in the application the whole document especially page 925-928 page 928; figure 7	

-/--

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 01/00646

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	J.F. TOSO ET AL: "MAGE-1-specific precursor cytotoxic T-Lymphocytes present among Tumor-infiltrating lymphocytes from a patient with breast cancer: Characterization and Antigen-Specific Activation" CANCER RESEARCH., vol. 56, 1 January 1996 (1996-01-01), pages 16-20, XP002197554 AMERICAN ASSOCIATION FOR CANCER RESEARCH, BALTIMORE, MD., US ISSN: 0008-5472 the whole document	1-40
A	WO 95 19783 A (CELIS ESTEBAN ;GREY HOWARD M (US); CYTEL CORP (US); KUBO RALPH T ( ) 27 July 1995 (1995-07-27) claims; examples	1-10,35, 37,38

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International Application No  
PCT/CA 01/00646

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0020445	A	13-04-2000	AU 5992999 A	26-04-2000
			EP 1117679 A2	25-07-2001
			WO 0020445 A2	13-04-2000
WO 9734009	A	18-09-1997	FR 2746110 A1	19-09-1997
			AU 732288 B2	12-04-2001
			AU 2164197 A	01-10-1997
			BR 9707994 A	27-07-1999
			CA 2248612 A1	18-09-1997
			CN 1218512 A	02-06-1999
			CZ 9802915 A3	16-12-1998
			EP 0889969 A1	13-01-1999
			WO 9734009 A1	18-09-1997
			HU 9902150 A2	29-11-1999
			JP 2000507229 T	13-06-2000
			NO 984052 A	03-09-1998
			SK 124698 A3	07-05-1999
WO 9940188	A	12-08-1999	AU 737337 B2	16-08-2001
			AU 2722099 A	23-08-1999
			BR 9907691 A	14-11-2000
			CA 2319309 A1	12-08-1999
			CN 1295616 T	16-05-2001
			WO 9940188 A2	12-08-1999
			EP 1053325 A2	22-11-2000
			HU 0102639 A2	28-11-2001
			JP 2002502604 T	29-01-2002
			NO 20003958 A	04-10-2000
			PL 342852 A1	16-07-2001
			TR 200002284 T2	21-11-2000
			ZA 9900872 A	04-08-2000
WO 9519783	A	27-07-1995	US 5662907 A	02-09-1997
			AU 1834095 A	08-08-1995
			AU 4111999 A	23-09-1999
			CA 2181920 A1	27-07-1995
			EP 0749315 A1	27-12-1996
			NZ 281409 A	28-01-2000
			SG 49743 A1	15-06-1998
			WO 9519783 A1	27-07-1995